RECLAMATION

Managing Water in the West

Technical Service Center Accomplishments for FY 2006

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center, Denver, Colorado

October 2006

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Executive Summary

The Technical Service Center (TSC) takes pride in being Reclamation's in-house provider of engineering and scientific services supporting design, construction, and planning activities; operation and maintenance programs; project management; and manual, standards, and guideline development. Superior product delivery and customer service are strategic goals of the TSC.

With more than 2,000 service agreements in place, last year the TSC completed dozens of designs, studies, and analyses; performed Value Program studies; supported safety, program management, financial management, and strategic vision efforts; developed control and computer software; authored numerous publications; and received national recognition.

Some notable FY06 TSC work accomplishments include:

- Provided key technical support to Reclamation's work on Folsom Dam as Reclamation and the U.S. Army Corps of Engineers (USACE) work together on a $1 billion project to address Reclamation's dam safety risk reduction and the USACE's flood damage reduction objectives.
- Completed designs for the removal of Chiloquin Dam and construction of a pumping plant to replace irrigation flows previously supplied by the reservoir behind the dam. The construction contract is currently scheduled to be awarded in spring of 2007.
- Completed hydrologic modeling studies in support of an initiative to investigate alternative futures for operation of the Klamath Hydropower Project. Modeling will allow analysis of hydrologic operations, hydropower generation, and revenue produced under current and proposed relicensing conditions.
- Completed most of the study work required to produce a comprehensive evaluation of alternatives for restoration of the Salton Sea.
- Supported construction of the Animas La Plata Project. The TSC has been instrumental in keeping the construction on schedule and under budget.

This report provides further details on these and other recent accomplishments.

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Introduction

TSC staff worked on 120 funded research projects and more than 2,000 service agreements in FY06. Last year, the TSC completed dozens of designs, studies, and analyses; performed Value Program studies; supported safety, program management, financial management, and strategic vision efforts; developed control and computer software; authored numerous publications; and received national recognition. Following are brief descriptions of some of these accomplishments.

Designs, Studies, and Analyses Supporting Construction and Operation and Maintenance Programs

Animas La Plata

The TSC supported construction of the Animas La Plata Project. The TSC has been instrumental in keeping the construction on schedule and under budget. FY06 accomplishments include:

- Addressing issues regarding dam construction in a timely manner.
- Completing adjustments to the pumping plant design.
- Completing specifications for construction of the inlet conduit and issuing them on time.

Gilt Edge Mine

The TSC completed designs, let a construction contract, and provided construction oversight services to EPA for completion of Phase 4 of the Ruby Waste-Rock Repository in South Dakota. The completed system has eliminated a hazard to wildlife and prevented further downstream water contamination associated with the old leaking pond.

Northwest Area Water Supply

The TSC worked for the Dakotas Area Office on the Northwest Area Water Supply (NAWS) project in North Dakota. The TSC is designing a 26-million-gallon-per-day water treatment system to treat water that will be transferred from the Missouri River basin to Minot, ND, in the Hudson Bay basin. A key concern is the transfer of non-indigenous or harmful biota, such as whirling disease, from one basin to the other. Three treatment system alternatives are under

consideration. The area office, EPA, and others will evaluate the cost and level of treatment provided by each alternative to develop a preferred alternative.

Salton Sea

In close collaboration with the Lower Colorado Region, the TSC completed most of the study work required to produce a comprehensive evaluation of alternatives for restoration of the Salton Sea.

Glory Hole Recreation Area

The TSC provided construction support for a potable water supply system and designed an extension of a gravity sewer system for Glory Hole Recreation Area at New Melones Lake, California.

Pilot Reviews

Two pilot reviews of TSC technical work products, Glen Canyon Dam Temperature Control Device and Navajo-Gallup Pipeline, concluded that the designs were done to the appropriate design level (one feasibility and one appraisal level) using applicable directives, design standards, and Reclamation guidance. The reviews also noted that the estimates were comprehensive and fully adequate for the purposes of supporting the level of design.

Design Work and Technical Support

The TSC completed extensive design work and provided technical support on numerous projects in FY06. For example, TSC staff:

- Designed and provided oversight on new digital governor systems commissioned at Shasta, Elephant Butte, and Mt. Elbert powerplants. These systems incorporate special features developed by TSC staff as a result of Science and Technology (S&T) funded power system stability research program efforts.
- Designed the electrical systems for Bear Creek and Island C pumping plants.
- Completed designs for the removal of Chiloquin Dam and construction of a pumping plant to replace irrigation flows previously supplied by the reservoir behind the dam. The construction contract is scheduled to be awarded in spring of 2007.
- Completed designs for the removal of Savage Rapids Dam and construction of a pumping plant to replace irrigation flows previously supplied by the reservoir behind the dam. Construction is now underway.

- Provided technical support and required submittal reviews for Lower Owens pumping plant.
- Provided technical support for the excitation system replacements for the Colorado Big Thompson Project (six powerplants).
- Prepared specifications and provided support for the replacement of the station service switchgear at Estes powerplant.
- Prepared specifications and provided support for the replacement of the air conditioning distribution system for the Eastern Colorado Area Office building.
- Provided technical support for the spare generator armature winding and stator core for the left and right powerplants at Grand Coulee. The spare armature winding and stator core will allow Grand Coulee to quickly recover from an in-service failure. The TSC also provided technical support during unit G2 testing at Grand Coulee after the electrical modifications.
- Provided technical support for the excitation system replacements for the Central and Northern California Area Offices (seven powerplants). Replacing the rotating exciters with fully static excitation systems will improve the efficiency by 1 to 2 percent and reduce the required maintenance.
- Prepared technical specifications and provided support for the Shasta units 1 and 2 generator uprates. These uprates will take advantage of the additional head that is available at Shasta.
- Prepared specifications and provided technical support in the replacement of the excitation systems at Glen Canyon powerplant. The TSC also provided technical assistance for the generator rewinds at Glen Canyon.
- Provided technical support during the generator rewind and installation of the excitation system on unit 3 at Parker powerplant.
- Provided assistance with some of the designs for the Date Street Building Complex to be built in Boulder City, Nevada.

Tularosa Basin National Desalinization Research Facility

The TSC provided key oversight of construction, technical support, and project management of the Tularosa Basin National Desalinization Research Facility, New Mexico. The TSC participated in weekly briefings on construction status, participated in the development of program plan, helped resolve issues, coordinated communication and responses to congressional and state inquiries, and participated in the Tularosa Program Review.

Grand Coulee

The TSC completed the Grand Coulee Efficiency Study funded by Bonneville Power Administration (BPA). The study identified several enhancements that could boost plant efficiency by 2.24 percent, which corresponds to a maximum of $17 million per year in additional wholesale revenue for BPA and Reclamation. Individual efficiency improvement possibilities that were identified in the study currently are being evaluated for potential deployment.

Loss measurements performed on new turbine runners at Grand Coulee showed that they failed to meet a contracted efficiency point and placed this upgrade project (hundreds of millions of dollars) in jeopardy. However, previous work (Science and Technology and field support) in current and voltage measurements had revealed under-reporting of the actual power being measured. Subsequent calibration tests at Grand Coulee showed that the power measurement had an error of more than 1 percent. New turbine runner loss tests that will account for these errors are scheduled for early next year.

Value Program Studies

The TSC manages Reclamation's Value Program. In FY05, the most recent year reported, Reclamation awarded 35 contracts for construction projects of more than $500,000 with a combined dollar value of $190,790,307. The value study savings associated with these awards is more than $11 million (not including Value Engineering Savings Proposals of $8,700).

Reclamation reported a cost savings of 5.9 percent (Department of Interior cost savings goal is 4 percent). For the first time in 10 years, each region met or exceeded the 4 percent savings goal.

Safety

Safety continues to be a high priority for the TSC. Ongoing research and field tests into the safety of personnel that work on electrical equipment has shown that possible exposure voltages were about three times higher than traditional methods calculated. Currently, TSC staff is working with the Institute of Electrical and Electronics Engineers (IEEE) to incorporate these findings into new electrical safety standards.

TSC staff conducted penstock inspections at three Reclamation facilities and one USACE facility. These inspections ensure the reliability of powerplant facilities as well as the safety of the general public.

Project Management

The Project Management Steering Committee worked toward its mission of continuing to monitor, improve, and disseminate TSC project management policies, procedures, and tools. The vision is that all TSC jobs will meet or exceed the client's schedule and budget expectations without compromising technical quality or safety. Among its accomplishments, the Committee

- Revised and updated the TSC Project Management Guidelines and Intranet site and conducted associated training courses.
- Revised and updated existing Earned Value Management Excel workbook/templates for both large and small jobs.
- Developed additional reports to track job schedule status (new jobs, jobs scheduled to be completed in 30 days, jobs completed on schedule, and overdue jobs). These reports and expenditure versus budget reports are distributed monthly to team leaders and TSC Leadership to assist staff in meeting deadlines and budgets. These metrics are included in employee performance plans.

Strategic Vision

The TSC completed work on several strategic initiatives in FY06, including several organizational consolidations, succession planning and knowledge transfer initiatives, recruiting and retention guidelines, and improved performance metrics. The TSC has developed additional strategic initiatives for FY07, including several to reduce costs and improve TSC efficiencies.

Other Accomplishments

Other accomplishments included reducing space requirements by 100,000 square feet and vacating Building 41. A recruiting team was established and recruiting guidelines were developed, with focus on minority recruiting.
In collaboration with Human Resources Office, the TSC New Employee Orientation Handbook, a comprehensive collection of information pertinent to new employee, was finalized.

Improved Financial Management

The TSC Director is overseeing the implementation and development of additional control measures in accordance with OMB Circular A-123, including:

- Released updated credit card review and retention guidance.

- Established centralized credit card files and points of contacts for all organizational units.
- Assigned a main TSC point of contact.
- Supported MSO internal audit of TSC purchase line and travel credit card statements. Exit conferences have noted improvement in our practices with the implementation of these new procedures.
- Developed systems to monitor and allocate cell phone costs.
- Supported cost and mileage data collection and reporting for TSC's Interior-owned vehicles.
- Implemented budget review of all TSC requisitions, personally reviewed all requisitions over $300,000.
- Standardized cost transfer and fee transfer request process.
- Required all TSC Leadership to take A-123 training and encouraged cascade training of others.
- Required TSC staff to provide timely review of invoices to ensure prompt payment.

Development of Diagnostic and Computer Modeling Tools

The TSC delivered to the Klamath Basin Area Office a numerical model of Klamath River flows under natural (predevelopment) conditions. This model, developed collaboratively with a stakeholder group, is a keystone of the ongoing study of the endangered fishes of the Klamath River Basin, including the science review being conducted by the National Academy of Science (NAS). The natural flow study of the Upper Klamath River provides an estimate of the natural flow of the Link River at Klamath Falls, Oregon, and of the Klamath River at Keno, Oregon, from October 1949 to September 2000. The study is currently being reviewed by the NAS.

The TSC also completed hydrologic modeling studies in support of an initiative to investigate alternative futures for operation of the Klamath Hydropower Project. Modeling will allow analysis of hydrologic operations, hydropower generation, and revenue produced under current and proposed relicensing conditions. This analysis forms the foundation for ongoing Settlement Negotiations, Federal Energy Regulatory Commission Relicensing, and Public Utility Commission Proceedings.

Animas-La Plata Project, Ridges Basin Dam performance monitoring instrumentation is being brought online, and the construction office is using the TSC DAMS database to help produce Ridges Basin Geology Bi-Weekly status reports.

Collaboration

Folsom Powerplant

The TSC provided key technical support to Reclamation's and the USACE's work on Folsom Dam. The $1 billion project addressed two objectives: Reclamation's dam safety risk reduction and the USACE's flood damage reduction. This project has received significant attention because of the large downstream population and consequences resulting from dam failure or flooding. This is the first major project in which Reclamation and the USACE have worked together on planning and design. Reclamation's focus will be to ensure safe passage of the probable maximum flood (PMF) and stabilizing the concrete dam and embankment dams and dikes for earthquake and operations loadings. The USACE's focus will be to increase flood damage reduction from the 100-year flood protection level to at least a 200-year flood protection level.

Ductile Iron Pipe Industry

The TSC worked with the Washington Office to respond to congressional and Ductile Iron Pipe Industry requests to modify the corrosion mitigation recommendations for ductile iron pipe contained in our Technical Memorandum 8140-CC-2004-1 "Corrosion Considerations for Buried Metallic Water Pipe" (TM). The TSC has also reached out to the U.S. Army Corps of Engineers to assess the potential for a joint Federal position on this issue and is evaluating further third party reviews of our technical recommendations as a means to demonstrate that our position is reasonable.

Improved Modeling for Embankment Dam Erosion and Breach Processes

TSC's Water Resources Research Laboratory and the Dam Safety Office are coordinating a long-term collaborative research effort aimed at developing improved numerical models for simulating embankment dam erosion and breach processes. The project is being carried out through the Dam Safety Interest Group of CEA Technologies, Inc., and involves technical contributions and sponsorship from a dozen North American and European hydroelectric utilities and agencies involved in dam safety.

The TSC is providing technical assistance in collaboration with the USACE, Bonneville Power Administration, and Hydro Quebec to create a Hydro Asset Management Partnership (Hydro AMP) guidance document to assist in the condition assessment of major equipment within hydroelectric powerplants. This assessment tool is currently undergoing minor rewrites and will assist in determining replacement schedules and budgets for major equipment.

The TSC is collaborating with the USACE to develop a detailed safety and engineering technical guidance document on mitigating electrical arc flash hazards within our hydroelectric facilities. These guidelines will be incorporated in both Reclamation and USACE policy requirements.

The TSC supported the Interior and Reclamation response for hurricane disaster recovery. The TSC recruited and facilitated workload adjustments to assist in the response to hurricane disaster recovery areas and in supporting the Departmental Emergency Support Function (ESF-3) Office and the Reclamation Emergency Operations Center (EOC) in Denver. The TSC deployed 44 employees who worked more than 30,000 hours clearing debris, covering damaged roofs with blue tarps, and performing other missions.

Manuals, Publications, Policies, Directives and Standards

The TSC produced the following in FY06:

- Two Facilities Instructions, Standards, and Techniques (FIST) Volumes:
  - FIST Volume 4-1B (revision), Maintenance Scheduling for Electrical Equipment
  - FIST Volume 3-8, Operation and Maintenance of Protective Relays and Associated Circuits

The primary benefits of the FIST volumes are the continued reliability and efficiency of our operation and maintenance program and associated cost savings.

- Eight Power Equipment Bulletins (these are supplemental to FIST volumes and address specific technical and safety issues.)
- Reclamation Cost Estimating Policy, Directives and Standards (Reclamation Manual numbered documents TRMR-08, TRMR-09, TRMR-10, TRMR-11). Final approval of the documents is expected soon, after which they will be posted on the Reclamation Manual website. The TSC ensured that the Cost Estimating Database was updated to included current construction cost data. No negative cost estimating issues were raised above executive's level in FY06.
- Technical Memorandum (TM) entitled "Forecasting Water Needs in the Municipal, Rural, and Industrial Sectors," made available to water conservation and planning practitioners throughout Reclamation. This document, in addition to describing data requirements for assessing future water needs, included a bibliography of state-of-the-art water conservation measures.

- *Weather and Soil Moisture Based Landscape Irrigation Scheduling Technical Review Report,* August 2006. This document describes new water-saving landscape irrigation products and was prepared for the Southern California Area Office as a tool for water agencies that provide rebates to customers purchasing these products.
- The TSC and the Lower Colorado Region have prepared draft reports in support of fulfilling Public Law 108-361. These reports include designs, cost estimates, economic analyses, and predictions of future conditions, viability assessments, and biologic evaluations of six alternatives.
- *Guidelines for Earthwork Control Testing of Gravelly Soils*
- *Design Guide for Heating, Ventilating, and Air Conditioning Systems*
- *State-of-Practice for the Nonlinear analysis of Concrete Dams*
- *Fish Protection at Water Diversions, A Guide to Planning and Designing Fish Exclusion Facilities*
- *Economic Analysis of Voluntary Water Transfers*

Also, the Record of Decision for the Platte River Recovery Implementation Program Final Environmental Impact Statement (FEIS) was signed September 27, 2006. This program will help maintain, improve, and conserve habitat for four threatened and endangered species that use the Platte River in Nebraska—the whooping crane, piping plover, interior least tern, and pallid sturgeon—and will enable existing and new water uses in the Platte River Basin to proceed without additional ESA requirements for the four target species.

More than 50 technical documents and publications utilized by Reclamation technical staff were scanned and posted on Reclamation's Intranet site in FY06. Also, many TSC Intranet sites were updated in FY06 because of organizational changes; the updates often included adding numerous additional links to reports and documents that have been presented at technical conferences, as well as details of ongoing and future research projects. A Web site and report titled "USBR Hydraulic Engineering and Water Resources Software" (http://www.usbr.gov/pmts/hydraulics_lab/software/hyd_software.html) was completed in FY06 that will improve dissemination of hydraulic software developed by the TSC.

Recognition

National

Jim Pierce was awarded the Honorary Member of the American Concrete Institute, its highest award. Jim was Chief of the Water Resources Division before his retirement January 3, 2006.

Reclamation

Dr. Blair Greimann was named the Technical Service Center Engineer of the year. Blair is the lead hydraulic engineer on the Matilija Dam Ecosystem Restoration Project in Ventura County, California. The project's goal is to improve the endangered steelhead trout populations and restore a natural sediment transport regime to the Ventura River. Blair is also leading an interagency research effort with the Geological Survey and the Agricultural Research Service on the development of new computer models to predict river hydraulics, sediment transport, bank erosion, and channel migration.

Superior Service Awards

- Richard Fuerst, Manager, Water Conveyance Group, for his significant engineering and managerial contributions related to civil, hydraulic, and materials engineering for canals, tunnels, and pipelines.
- Rick Ehat, Construction Management Group, for his exceptional knowledge, ability, and initiative in managing the construction of heavy civil work, most recently in the construction of the Animas-La Plata Project.
- John LaBoon, Manager, Waterways and Concrete Dams Group, for distinguishing himself as one of Reclamation's leading authorities in concrete dam analysis and design through his technical work on numerous projects, including modifications to Theodore Roosevelt, Bartlett, Pueblo, and Folsom Dams.
- Richard Grotzke, Manager, Construction Management Group, for leadership in the fields of procurement and construction management, which included significant contributions in developing and executing complicated engineering and construction contracts with foreign government to accomplish major modification to Aswan Dam and water supply projects in Saudi Arabia.
- Al Bernstein, Civil Engineer, for his significant contributions during his 25 years of Government service, including design, analysis and evaluation for modifications and construction of pumping plants and powerplants, and in advancing Reclamation's Accessibility Program.
- Fred Nibling, Environmental Applications and Research Group, for his significant career technical and leadership achievements. Fred has been the primary driving force in developing Reclamation's invasive species program.